CLAIMS

What is claimed is:

1.   A method for protecting consistency groups during a data storage backup operation, comprising:

transferring data updates from a host device to primary PPRC volumes on a primary PPRC unit;

upon the primary PPRC volumes forming a consistency group, transferring the primary PPRC volumes to FlashCopy source volumes on a secondary PPRC unit;

attempting to prepare each FlashCopy source volume for a FlashCopy operation, including imposing a write-inhibit indicator on a FlashCopy source volume;

committing a FlashCopy operation of the consistency group from the FlashCopy source volumes to corresponding FlashCopy target volumes if the preparation of all FlashCopy source volumes is successful, whereby a prior consistency group retained in the FlashCopy target volumes is replaced; and

reverting the FlashCopy operation if the preparation of any FlashCopy source volume is unsuccessful, whereby the prior consistency group is maintained in the FlashCopy target volumes.

2.   The method of claim 1, wherein a write-inhibit indicator is operable to prevent the to reception of data updates by the FlashCopy source device transmitted from the PPRC source device during a FlashCopy operation.

3.   The method of claim 1, further comprising releasing the write-inhibit indicators if the preparation of all FlashCopy source volumes is successful.

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4.   The method of claim 1, wherein the step of preparing each FlashCopy source volume for a FlashCopy operation comprises generating an Establish-FlashCopy-revertable command.

5.   The method of claim 4, wherein the step of committing the FlashCopy operation comprises generating a Withdraw-FlashCopy-commit command.

6.   The method of claim 5, wherein the step of reverting the FlashCopy operation comprises generating a Withdraw-FlashCopy-revert command.

7.   The method of claim 1, wherein:
        the method further comprises deciding after an attempt to prepare each FlashCopy source volume whether the preparation is successful; and
        the reverting step comprises reverting the FlashCopy operation following any unsuccessful preparation.

8.   The method of claim 1, wherein:
        the method further comprises deciding after attempts to prepare all FlashCopy source volumes whether the preparations of all FlashCopy source volumes are successful; and
        the reverting step comprises reverting the FlashCopy operation if the decision identifies any unsuccessful preparation.

9.   A system for protecting consistency groups during a data storage backup operation, comprising:
        a FlashCopy source device coupled to receive data updates comprising a consistency group from a primary PPRC device, the consistency group comprising at least one volume;
        a FlashCopy target device coupled to receive FlashCopy source volumes from the FlashCopy source device, the FlashCopy target device retaining a prior consistency group;

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means for preparing each FlashCopy source volume for a FlashCopy operation, including means for imposing a write-inhibit indicator on the FlashCopy source volume;

means for committing a FlashCopy operation of the consistency group from the FlashCopy source volumes to corresponding FlashCopy target volumes if the preparation of all FlashCopy source volumes is successful, whereby the prior consistency group stored in the FlashCopy target device is replaced; and

means for reverting the FlashCopy operation if the preparation of any FlashCopy source volume is unsuccessful, whereby the prior consistency group is maintained in the FlashCopy target device.

10.   The system of claim 9, further comprising means, responsive to the write-inhibit indicators, for preventing the reception of data updates by the FlashCopy source device transmitted from the PPRC source device during a FlashCopy operation.

11.   The system of claim 9, further including means for releasing the write-inhibit indicators if the preparation of all FlashCopy source volumes is successful.

12.   The system of claim 9, wherein:

the system further comprises means for deciding after an attempt to prepare each FlashCopy source volume whether the preparation is successful; and

the means for reverting comprises means for reverting the FlashCopy operation following any unsuccessful preparation.

13.   The system of claim 9, wherein:

the system further comprises means for deciding after attempts to prepare all FlashCopy source volumes whether the preparations of all FlashCopy source volumes are successful; and

the means for reverting comprises means for reverting the FlashCopy operation if the decision identifies any unsuccessful preparation.

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14.	A data storage system, comprising

	a primary storage controller coupled to receive data updates from at least one host device;

	a first storage unit coupled to the primary storage controller for storing primary PPRC volumes;

	a secondary storage controller coupled to the primary storage controller;

	a second storage unit coupled to the secondary storage controller for storing FlashCopy source volumes;

	a third storage unit coupled to the secondary storage controller for retaining FlashCopy target volumes; and

	an application executing on the secondary storage controller, the application comprising instructions for:

		transferring data updates from the at least one host device to the primary PPRC volumes;

		upon the primary PPRC volumes forming a consistency group, transferring the primary PPRC volumes to the FlashCopy source volumes;

		attempting to prepare each FlashCopy source volume for a FlashCopy operation, including imposing a write-inhibit indicator on a FlashCopy source volume;

		committing a FlashCopy operation of the consistency group from the FlashCopy source volumes to corresponding FlashCopy target volumes if the preparation of all FlashCopy source volumes is successful, whereby a prior consistency group retained in the FlashCopy target volumes is replaced; and

		reverting the FlashCopy operation if the preparation of any FlashCopy source volume is unsuccessful, whereby the prior consistency group is maintained in the FlashCopy target volumes.

15.	The data storage system of claim 14, further comprising means, responsive to the write-inhibit indicators, for preventing the reception of data updates by the

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secondary storage controller transmitted by the primary storage controller during a FlashCopy operation.

16.   The data storage system of claim 15, further including means for releasing the write-inhibit indicators if the preparation of all FlashCopy source volumes is successful.

17.   The data storage system of claim 14, wherein preparing each FlashCopy source volume for a FlashCopy operation comprises generating an Establish-FlashCopy-revertable command.

18.   The data storage system of claim 17, wherein committing the FlashCopy operation comprises generating a Withdraw-FlashCopy-commit command.

19.   The data storage system of claim 18, wherein reverting the FlashCopy operation comprises generating a Withdraw-FlashCopy-revert command.

20.   The data storage system of claim 14, wherein:
         the application further comprises instructions for deciding after an attempt to prepare each FlashCopy source volume whether the preparation is successful; and
         reverting comprises reverting the FlashCopy operation following any unsuccessful preparation.

21.   The data storage system of claim 14, wherein:
         the application further comprises instructions for deciding after attempts to prepare all FlashCopy source volumes whether the preparations of all FlashCopy source volumes are successful; and
         reverting comprises reverting the FlashCopy operation if the decision identifies any unsuccessful preparation.

22.   A computer program product of a computer readable medium usable with a programmable computer, the computer program product having computer-readable code embodied therein for protecting consistency groups during a data storage backup operation, the computer-readable code comprising instructions for:

transferring data updates from a host device to primary PPRC volumes on a primary PPRC unit;

upon the primary PPRC volumes forming a consistency group, transferring the primary PPRC volumes to FlashCopy source volumes on a secondary PPRC unit;

attempting to prepare each FlashCopy source volume for a FlashCopy operation, including imposing a write-inhibit indicator on a FlashCopy source volume;

committing a FlashCopy operation of the consistency group from the FlashCopy source volumes to corresponding FlashCopy target volumes if the preparation of all FlashCopy source volumes is successful, whereby a prior consistency group retained in the FlashCopy target volumes is replaced; and

reverting the FlashCopy operation if the preparation of any FlashCopy source volume is unsuccessful, whereby the prior consistency group is maintained in the FlashCopy target volumes.

23.   The computer program product of claim 22, wherein the write-inhibit indicator is operable to prevent the reception of data updates by the FlashCopy source device transmitted from the PPRC source device during a FlashCopy operation.

24.   The computer program product of claim 22, the instructions further comprising releasing the write-inhibit indicators if the preparation of all FlashCopy source volumes is successful.

25.   The computer program product of claim 22, wherein the instructions for preparing each FlashCopy source volume for a FlashCopy operation comprises instructions for generating an Establish-FlashCopy-revertable command.

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26.	The computer program product of claim 25, wherein the instructions for committing the FlashCopy operation comprises instructions for generating a Withdraw-FlashCopy-commit command.

27.	The computer program product of claim 26, wherein the instructions for reverting the FlashCopy operation comprises instructions for generating a Withdraw-FlashCopy-revert command.

28.	The computer program product of claim 22, wherein:

the computer program product further comprises instructions for deciding after an attempt to prepare each FlashCopy source volume whether the preparation is successful; and

the instructions for reverting step comprise instructions for reverting the FlashCopy operation following any unsuccessful preparation.

29.	The computer program product of claim 22, wherein:

the computer program product further comprises instructions for deciding after attempts to prepare all FlashCopy source volumes whether the preparations of all FlashCopy source volumes are successful; and

the instructions for reverting comprise instructions for reverting the FlashCopy operation if the decision identifies any unsuccessful preparation.

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